

10/562921

IAP6 Rec'd PCT/PTO 29 DEC 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

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Corres. to PCT/EP2004/006634

For: LOUVRE FOR AN AIR-CONDUCTION HOUSING OF A MOTOR VEHICLE
AIR-CONDITIONING SYSTEM

VERIFICATION OF TRANSLATION

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Sir:

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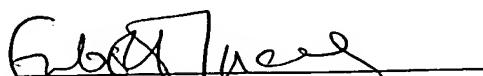
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December 16, 2005

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Name: E. A. LUCAS
For and on behalf of RWS Group Ltd

Louver for an air-conduction housing of a motor vehicle
air-conditioning system

The invention relates to a louver for an air-conduction
5 housing of a motor vehicle air-conditioning system and
to a heating or air-conditioning device.

Conventionally, a plurality of louvers which control
the air flow in different air ducts are used in air-
10 conduction housings. This is the case particularly when
a stratified flow is to be generated, for which purpose
cold air and warm air are mixed in a controlled way, in
regions, so as to form temperature stratification, and,
in regions, are conducted parallel to one another. For
15 this purpose, conventionally, a plurality of air ducts
are designed correspondingly, the louvers being
arranged in these and, as a rule, so as to be spaced
apart from one another and generally being activated
individually as a function of one another and being
20 actuated by a servomotor.

Furthermore, a louver of correspondingly subdivided
design may be used, in which case the louver is
subdivided by partitions of the air-conduction housing
25 which separate the air ducts from one another. A louver
of this type consisting of individual regions formed
separately from one another is simpler to control, but
still leaves desires, particularly with regard to the
construction space requirement, unsatisfied.

30 The object of the invention is to make available an
improved louver for an air-conduction housing of a
motor vehicle air-conditioning system, and at the same
time, in particular, the utilization of the
35 construction space is to be optimized and the cross

section of the cold-air path is to be obstructed as little as possible.

This object is achieved by means of a louver having the
5 features of claim 1. Advantageous refinements are the subject matter of the subclaims.

According to the invention, a louver for an air-conduction housing of a motor vehicle air-conditioning system is provided, the louver having, to allow air stratification, a plurality of regions which are directly adjacent to one another and are subdivided by partitions which, in contrast to conventional louvers, are not part of the air-conduction housing, but are 10 part of the louver, so that the louver itself forms air ducts which, in a corresponding louver position, guide the air in a controlled way and supply it to further air ducts. By the partitions being integrated in a louver in the region of the latter, the construction 15 space requirement is reduced, since the partitions provided in the case of conventional louvers may be dispensed with.
20

The louver preferably has two outer regions and a middle region lying between them. In this case, the louver is preferably designed mirror-symmetrically with respect to the center plane which extends perpendicularly with respect to the pivot axis. In this 25 case, preferably, the flow cross section of the two outer regions is approximately as large as the flow cross section of the middle region.
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Preferably, the louver has at least one region with a configuration in the manner of a drum-type louver, that 35 is to say, in this region, the outer wall of the louver is arranged preferably concentrically with respect to the pivot axis of the louver.

Preferably, moreover, the louver has at least one region which is planar and runs parallel with respect to the pivot axis and/or is curved toward the pivot axis and which is preferably a middle region.

5

At least two of the different regions of the louver preferably extend over a different distance with respect to the circumference of the latter.

10 Preferably, at least one region of the louver has, on at least one side, an end running obliquely with respect to the pivot axis, so that, during a rotation of the louver, the air passage is opened slowly. In this case, this end may be straight or else have any
15 other, in particular arcuate profile. In this case, in particular, a control characteristic can be integrated into the configuration of the louver in a simple way, so that the corresponding actuating movement can be simplified.

20

To increase stability, the louver preferably has a bridge, in particular in a planar or slightly curved region, said bridge connecting the partitions of a region to one another. In this case, the bridge may be
25 of curved design for the purpose of performing a guide function.

For sealing off in at least one end position, the louver preferably has at least one outwardly extending
30 edge which, in this end position, bears sealingly against the air-conduction housing at a corresponding bearing point. Additional sealing means, such as, for example, elastic sealing elements, may be provided at this edge.

35

To optimize the sealing function, the edge preferably extends beyond the end faces, if possible as far as the pivot axis or the corresponding mounting.

The louver is preferably produced in one piece, in particular as a plastic injection molding. Such a design allows cost-effective production.

5

Owing to the special design of the louver, for example obliquely running ends of individual regions of the louver, edges which project outward, individual regions extending over a different distance with respect to the 10 circumference of the louver, along with a corresponding configuration of the air-conduction housing, regulation is simplified, since essential regulation characteristics are already contained in the louver form and in the air-conduction housing form cooperating 15 with this, so that the actuating movement is simplified and therefore simpler servomotors and/or simpler controls can be used.

The invention is explained in detail below by means of 20 an exemplary embodiment, with reference to the drawing in which:

25

fig. 1 shows a perspective view of an air-conduction housing,

fig. 2 shows the air-conduction housing of fig. 1, cut away in regions, from the same perspective,

30

fig. 3 shows a section through the air-conduction housing in the center of the louver in the 100% warm louver position,

35

fig. 4 shows a section through the air-conduction housing in the lateral region of the louver in the louver position of fig. 3,

- 5 -

fig. 5 shows a section through the air-conduction housing in the center of the louver in the 75% warm louver position,

5 fig. 6 shows a section through the air-conduction housing in the lateral region of the louver in the louver position of fig. 5,

10 fig. 7 shows a section through the air-conduction housing in the center of the louver in the 50% warm louver position,

15 fig. 8 shows a section through the air-conduction housing in the lateral region of the louver in the louver position of fig. 7,

20 fig. 9 shows a section through the air-conduction housing in the center of the louver in the 0% warm louver position,

25 fig. 10 shows a section through the air-conduction housing in the lateral region of the louver in the louver position of fig. 9,

fig. 11 shows a perspective view of the louver,

30 fig. 12 shows the view of fig. 11 with an illustration of the sectional lines of figures 3 to 10,

35 fig. 13 shows the louver from another perspective, and

fig. 14 shows a cross section through the louver.

A motor vehicle air-conditioning system 1 with a blower 2, with an evaporator 3, with a heater 4 and with an additional heater 5, which are arranged in an air-
5 conduction housing 7 of multipart design, has a mixing louver 6 for the on-demand thermal control and generation of a stratified air flow.

The thermally controlled air can be supplied to various
10 regions of the vehicle interior via air ducts regulated by means of louvers. Thus, an air duct 8 is provided which branches off from the air-conduction housing 7 and which serves for defrosting the windshield. The air quantity conducted through the defrosting air duct 8 is
15 regulated by means of a defrosting louver 9. A further air duct 10 leads to the side and middle nozzles and can be regulated by means of a louver 11. Furthermore, a foot-space air duct 12 is provided which can be regulated by means of a foot-space louver 13.

20 As is evident from fig. 1, the ventilation air duct 10 is designed in three parts, in the present case the three subducts having in each case approximately the same cross section. They serve, in cooperation with the
25 louver 6, for air stratification between the middle and the side nozzle.

In order to make this air stratification possible by means of a single louver which makes partitions or
30 specially designed cold-air ducts unnecessary and therefore has a somewhat lower construction space requirement, the three-part louver 6 according to the present exemplary embodiment is provided. This has, in its pivot axis, two tenons 14 which are arranged on the
35 end faces 15. The louver 6 is designed mirror-symmetrically with respect to a plane running perpendicularly with respect to the pivot axis in the

center of the louver 6, the sectional lines of this plane with the louver 6 being illustrated in fig. 12.

The louver 6, by virtue of its symmetry, has two outer regions 16 and a middle region 17. It is designed in the manner of a drum-type louver in its outer regions 16, that is to say the louver 6 has the configuration of part of a hollow cylinder. On a side 18 extending in the longitudinal direction of the louver 6, the regions 16 and 17 terminate at the same height, there being provided, for better sealing off, a radially outwardly extending edge 19 which also extends beyond the end faces 15 as far as the tenons 14. According to the present exemplary embodiment, the flow cross section of the two outer regions 16 together corresponds approximately to the flow cross section of the middle region 17.

The middle region 17 is designed to be curved or concave in the direction of the pivot axis and is separated from the lateral regions 16 by walls 20. At the end of the walls 20 which is on the pivot-axis side, these are connected by means of a bridge 21, the latter being curved slightly according to the middle region 17. This bridge 21 serves, on the one hand, as a kind of spoiler with an air guide function and, on the other hand, for increasing the stability of the louver 6.

On that side 22 of the louver 6 which lies opposite the side 18, the regions 16 and 17 terminate at different heights, as is evident particularly from fig. 13. To improve the opening behavior, the outer regions 16 are of beveled design, that is to say, in particular, they do not run parallel with respect to the pivot axis. The middle region 17 terminates parallel to the pivot axis, again an outwardly extending edge 23 being provided, which also extends beyond the outside of the outer

regions 16 and the end faces 15 as far as the tenons 14 and therefore as far as the edge 19.

5 The functioning of the louver 6 is explained in more detail below with reference to figures 3 to 10.

Figures 3 and 4 show the 100% warm position, that is to say the louver 6, with all the regions 16 and 17, closes the path for the cold air coming directly from 10 the evaporator 3. In this case, the louver 6 bears with its edge 19 against the correspondingly designed air-conduction housing 7, so that no cold air can arrive at the air ducts 8 and 12. The flow path of the warm air coming from the heater 4 and additional heater 5 is 15 illustrated by means of unbroken arrows for the situation where the defrosting and foot-space louvers 9 and 13 are open. The louver 11 for the supply of air to the side and middle nozzles is closed according to the illustration.

20 When the louver 6 is moved slowly into its other end position, as illustrated in figures 5 and 6, then, in the middle region 17 of the louver 6, a cold-air passage is released on both sides, through which cold 25 air flows, in particular, into the defrosting air duct 8. What is achieved thereby is that the temperature of the air which is guided into the foot space is higher than the temperature of the air which passes into the defrosting air duct 8. Since the outer regions 16 are 30 designed to be wider, the cold-air passage in these regions is still closed. The flow path of the cold air is illustrated in the drawing by means of dotted arrows.

35 In the event of a further movement of the louver 6, as illustrated in figures 7 and 8, the cold-air passage in the middle region 17 is opened increasingly more widely, so that the temperature falls further. In the

outer regions 16, the cold-air passages slowly begin to open on account of the beveling, and, in the outer regions 16, cold air arrives, in particular, at the defrosting air duct 8. Here, too, temperature stratification giving the passenger a pleasant feeling is achieved, in that the temperature of the air which is guided into the foot space is higher than the temperature of the air which enters the defrosting air duct 8.

10

With louver positions which cause opening or at least partial opening of the air duct 10 (not illustrated in figures 3 to 8), temperature stratification between middle and side air ducts is obtained. By virtue of the described form of the louver 6, the temperature of the air which is supplied to the middle nozzle or middle nozzles is lower than the air temperature in the side nozzles, thus likewise contributing to an increase in comfort in the interior, since the radiation of heat via the side windows is higher than in the middle of the passenger space, and the temperature stratification described brings about an equalization of at least the temperature profile felt by the passenger.

When the warm-air passage is closed completely, as in figures 9 and 10, cold air arrives at the corresponding air ducts 8, 10 and 12 in all the regions 16 and 17. In this case, in the exemplary embodiment illustrated, both the defrosting air duct 9 and the air duct 12 into the foot space are closed, and only uniformly cold air enters the ducts 10 with the side and middle nozzles.

A stratification of the air can thus be made possible, and, in all the mixed or intermediate positions of the louver 6, the air supplied to the windshield is colder than the air supplied to the foot space or the air supplied to the middle nozzles is colder than the air supplied to the side nozzles.

List of reference symbols

- 1 Motor vehicle air-conditioning system
- 2 Blower
- 3 Evaporator
- 4 Heater
- 5 Additional heater
- 6 Louver
- 7 Air-conduction housing
- 8 Defrosting air duct
- 9 Defrosting louver
- 10 Air duct
- 11 Louver
- 12 Foot-space air duct
- 13 Foot-space louver
- 14 Tenon
- 15 End faces
- 16 Outer region
- 17 Middle region
- 18 Side
- 19 Edge
- 20 Wall
- 21 Bridge
- 22 Side
- 23 Edge